ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

HW 739

MEMORANDUM

DATE: January 28, 1988

TO: John Osborn, FIT-RPO, USEPA, Region X

FOR: Joyce Crosson, RSCC, USEPA, Region X

THRU: David Buecker, FIT-OM, E&E, Seattle

FROM: James Herndon, Chemist, E&E, Seattle
Andrew Hafferty, Senior Chemist, E&E, Seattle

SUBJ: QA of Case SAS 3453J (Sulfate, Phosphates/Phosphorus, Fluoride)
Monsanto Chemical Company

TDD: F10-8702-06

CC: Raleigh Farlow, ESD-DPO, USEPA, Region X
Gerald Muth, DPO, USEPA, Region X, Laboratory
Charles Sands, DPO, USEPA, Region III
John Osborn, ESD-PO, USEPA, Region X
Deborah Flood, HWD-SM, USEPA, Region X
Jeffrey Whidden FIT-PM, E&E, Seattle

The Quality Assurance review of 18 samples, Case SAS 3453J, collected from Monsanto Chemical, has been completed. The 16 water and two soil samples were analyzed at low level for sulfate, fluoride, orthophosphate, hydrolyzable phosphorus and total phosphorus by Centec Analytical Services of Salem, Virginia. The samples were numbered:

EPA #	Lab #	Matrix	*	EPA #	Lab #	Matrix
3453J-01	68379	Water	*	3453J-10	68388	Water
3453J-02	68380	Water	*	3453J-11	68389	Water
3453J-03	68381	Water	*	3453J-12	68390	Water
3453J-04	68382	Water	*	3453J-13	68391	Water
3453J-05	68383	Water	*	3453J-15	68392	Soil
3453J-06	68384	Water	*	3453J-17	68393	Soil
3453J-07	68385	Water	*	3453J-18	68394	Water
3453J-08	68386	Water	*	3453J-20	68395	Water
3453J-09	68387	Water	*	3453J-28	68396	Water

6289

Data Qualifications

The following comments refer to the laboratory performance in meeting the analysis as outlined in the Method for Chemical Analysis of Water and Wastes (3/83), method 340.1, 365.1 and 375.1. Quality Control specifications were outlined in the memorandum from Andrew Hafferty (Ecology and Environment, Seattle) on October 28, 1987.

1) Timeliness - Acceptable

Sample Number	Sample Date	Recd. Date	Ophos. Anal.	Hphos. Anal.	Tphos. Anal.	Sulf. Anal.	Fluro. Anal.
3453J-01	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-02	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-03	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-04	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-05	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-06	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-07	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-08	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-09	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-10	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-11	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-12	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-13	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-15	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-17	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-18	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-20	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14
3453J-28	11/3-4	11/07	11/09	12/03	12/03	12/04	12/14

Ophos. = Orthophosphate
Hphos. = Hydrolyzable phosphorus
Tphos. = Total phosphorus
Sulf. = Sulfate
Fluro. = Fluoride

The holding times for these parameters were taken from the Method for Chemical Analysis of Water and Wastes (3/83). Holding times are as follows:

Parameter	Holding Time
Orthophosphate	48 hr.
Hydrolyzable phosphorus	28 days
Total phosphorus	28 days
Sulfate	28 days
Fluoride	28 days

All parameters except Fluoride and Orthophosphate met the holding time requirements. Fluoride analysis was done 37 days after receipt. Orthophosphate analyses were completed by the laboratory by within five to six days after collection. Samples were held three to four days in the field prior to shipment to the laboratory. No significant effect is expected from the delay in that analysis.

2) Initial Calibration - Acceptable

The laboratory performed a six point initial calibration on each parameter. Results of analyses by linear regression follow:

Parameter	Slope	Intercept	r
Orthophosphate.	100.3	-0.1299	0.9999
Hydrolyzable phosphorus #1	105.8	0.5734	0.9931
Hydrolyzable phosphorus #2	100.8	0.5172	0.9997
Hydro. & Total phosphorus	99.31	0.2135	0.9999
Sulfate	0.3558	-8.998	0.9947
Fluoride	-0.1441	0.2781	0.9958

r = correlation coefficient

The 1.0 ppm standard in the initial calibration for Orthophosphate was out of range on the chart recorder. That standard was used in the calculation of regression. The effect on data quality is not significant in light of the good recoveries of the continuing calibration standards.

The sulfate curve as drawn by the lab is non-linear between the concentrations 10 and 100 ppm. The correlation coefficient for the initial calibration is high enough to assure no significant effect on data quality.

3) Continuing Calibration - Acceptable

The laboratory analyzed continuing calibration standards and blanks at approximately every 10 samples. The recoveries for these standards were between 98% and 105% for all parameters.

4) Continuing Calibration Blanks - Acceptable

No positive results above instrument detection limits for the Continuing Calibration Blanks were found.

5) Instrument Detection Limits - Acceptable

The detection limits for the instrument were not calculated. The lowest detectable standard was considered to be the detection limit.

Parameter	IDL	MDL
Orthophosphate	0.01ppm	0.01ppm
Hydrolyzable phosphorus	0.01ppm	0.01ppm
Total phosphorus	0.01ppm	0.01ppm
Sulfate	10.0ppm	10.0ppm
Fluoride	0.10ppm	0.10ppm

IDL = Instrument Detection Limit
MDL = Method Detection Limit

6) Laboratory Control Sample - Acceptable

EPA Water Pollution Control Samples were analyzed with each parameter.

Parameter & Run Number	Control Sample #	Recovery
Orthophosphate.	WP-284-7	90%
Hydrolyzable phosphorus #1	WP-284-7	85%
Hydrolyzable phosphorus #2	WP-284-7	95%
Sulfate	WP-1185	87%
Fluoride	WP-384	94%

7) Duplicate Sample Analysis

The RPD for the duplicate analysis of sample 3453J-20 for total phosphorus was miscalculated. Recalculation using data from the raw data tracings gives a sample value of 5 ppm (vs. 6.5 ppm) and a duplicate value of 7 ppm. The RPD is then 33% (vs. 7%)

Duplicate analysis for the soil samples did not include Orthophosphate or Hydrolyzable phosphorus.

The procedure for analysis of duplicates did not follow the outline of the QC requested in the memorandum. All requested parameters were found in the non-spiked samples analyzed in duplicate. The analysis data generated fills the need for duplicate Quality Control.

RPD values for duplicate soil and water samples were within acceptable limits for the analyses.

8) Spiked Sample Analysis - Acceptable

Values for the recovery of spikes and samples were listed at half the true value for all parameters. This was caused by the 1:1 dilution that occurred in the spiking procedure. The formula given on the Spike Sample Recovery form was incorrect for the calculation of recoveries given the values on the form. Values reported on the summary forms were correct.

The spike recovery values for the soil and water samples were within acceptable limits for the analysis.

9) Sample Analysis

No flagging of the data was necessary.

10) Laboratory Contact

No contact was required.

Data Use

The usefulness of the data is based generally on the criteria outlined in the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" (R-582-5-5-01).

Upon consideration of the above comments, the data is ACCEPTABLE for use except where flagged with data qualifiers which modify the usefulness of individual values.

Additional data packages associated with this project are expected from CLP or EPA laboratories.

Data Qualifiers

C - Concentration Qualifier

J - Reported value is less than the Contract Required Detection Limit (CRDL) but greater than the Instrument Detection Limit (IDL).

U - Analyte was tested for but not detected.

Q - Quality Qualifier

E - Reported value is estimated because of the presence of interference. Explanatory note is included in the Cover Page (if the problem applies to all samples) or on the form I-IN (if it is an isolated problem).

M - Duplicate injection precision not met.

N - Spiked sample recovery not within control limits.

S - The reported value was determined by the Method of Standard Additions (MSA).

W - Post digestion spike for Furnace AA analysis is out of control limits (85 to 115%), while sample absorbance is less than 50% of spike absorbance.

F - Concentration of this element exceeds either the primary or secondary drinking water standard listed in the Safe Drinking Water Act of 1974.

* - Duplicate analysis not within control limits.

+ - Correlation coefficient for the MSA is less than 0.995.

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I A

U.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-01

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68379 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/L

1. Sulfate (SO_4)	104
2. Fluoride (F)	1.1
3. Total Phosphorus (TP)	2.20
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.37

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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Form I B

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Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453J-02

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68380 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	74
2. Fluoride (F)	0.3
3. Total Phosphorus (TP)	0.37
4. Hydrolyzable Phosphorus (HP)	0.01
5. Orthophosphate (OP)	0.01

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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1/27/88

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Form I C

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Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453J-03

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 69381 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	74
2. Fluoride (F)	0.3
3. Total Phosphorus (TP)	0.36
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.04

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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Form I D

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EPA Sample # 3453 J-04

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68382 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	34
2. Fluoride (F)	1.0
3. Total Phosphorus (TP)	0.04
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.01u

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

DDQS
1/21/88

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Form I E

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EPA Sample # 3453J-05

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68383 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/L

1. Sulfate (SO_4)	140
2. Fluoride (F)	17
3. Total Phosphorus (TP)	1.50
4. Hydrolyzable Phosphorus (HP)	0.05
5. Orthophosphate (OP)	0.06

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

1/21/88

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Form I F

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Alexandria, Virginia 22314
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EPA Sample # 3453 J-06

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68384 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	180
2. Fluoride (F)	7.2
3. Total Phosphorus (TP)	0.31
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.01

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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1/24/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I G

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703/557-2490 FTS: 8-557-2490

EPA Sample # 3453J-07

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68385 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l J

1. Sulfate (SO_4)	940
2. Fluoride (F)	6.1
3. Total Phosphorus (TP)	0.35
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.02

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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1/22/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I H

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EPA Sample # 3453 J-08

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68386 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/L

1. Sulfate (SO_4)	40C
2. Fluoride (F)	22
3. Total Phosphorus (TP)	4.50
4. Hydrolyzable Phosphorus (HP)	0.03
5. Orthophosphate (OP)	0.16

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

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Form I I

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EPA Sample # 3453 J-09

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68387 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l / J

1. Sulfate (SO_4)	190
2. Fluoride (F)	0.4
3. Total Phosphorus (TP)	0.34
4. Hydrolyzable Phosphorus (HP)	0.02
5. Orthophosphate (OP)	0.01u

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager JPills

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CAS
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Form I J

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EPA Sample # 3453 J-10

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68388 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	260
2. Fluoride (F)	5.6
3. Total Phosphorus (TP)	0.29
4. Hydrolyzable Phosphorus (HP)	0.01
5. Orthophosphate (OP)	0.01u

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

12/22/87

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Form I K

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EPA Sample # 3453 J-11

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68389 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium ____

Matrix: Water ✓ Soil ____ Sludge ____

Other ____ Units mg/l

1. Sulfate (SO_4)	640
2. Fluoride (F)	11
3. Total Phosphorus (TP)	3.90
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.52

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: ____

Lab Manager [signature]

ppm
1/27/88

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Form I L

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EPA Sample # 3453 J-12

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68390 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	50
2. Fluoride (F)	1.0
3. Total Phosphorus (TP)	0.18
4. Hydrolyzable Phosphorus (HP)	0.01u
5. Orthophosphate (OP)	0.01

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

9028
1/22/87

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I M

U.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-13

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68391 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/L

1.	Sulfate (SO_4)	68
2.	Fluoride (F)	5.0
3.	Total Phosphorus (TP)	0.32
4.	Hydrolyzable Phosphorus (HP)	0.02
5.	Orthophosphate (OP)	0.04

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager J Pelles

DDT 1/27/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I N

U.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-15

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68392 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water _____ Soil ✓ Sludge _____

Other _____ Units mg/kg
J C

1. Sulfate (SO_4)	2000
2. Fluoride (F)	45000
3. Total Phosphorus (TP)	0.02
4. Hydrolyzable Phosphorus (HP)	6.0
5. Orthophosphate (OP)	0.79

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Result in wet weight, percent solids not requested.

Lab Manager [signature]

JPT 1/21/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I

U.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453J-17

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68393 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium

Matrix: Water Soil ✓ Sludge

Other Units mg/kg
U J

1. Sulfate (SO_4)	1000
2. Fluoride (F)	2500
3. Total Phosphorus (TP)	115
4. Hydrolyzable Phosphorus (HP)	835
5. Orthophosphate (OP)	0.19

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: Results in wet weight, percent solids not requested

Lab Manager

9907
1/27/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I P

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Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-18

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68394 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/l

1. Sulfate (SO_4)	400
2. Fluoride (F)	36
3. Total Phosphorus (TP)	252
4. Hydrolyzable Phosphorus (HP)	169
5. Orthophosphate (OP)	145

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

9998
1/2/88

CAS
CENTEC ANALYTICAL SERVICES, INC.

Form I Q

U.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-20

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

LAB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

SOW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

LAB SAMPLE ID NO. 68395 QC REPORT NO. 226

Elements Identified and Measured

Concentration: Low ✓ Medium _____

Matrix: Water ✓ Soil _____ Sludge _____

Other _____ Units mg/L

1. Sulfate (SO_4)	1400
2. Fluoride (F)	45
3. Total Phosphorus (TP)	6.50
4. Hydrolyzable Phosphorus (HP)	2.20
5. Orthophosphate (OP)	148

Footnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

Comments: _____

Lab Manager _____

9000
1/27/88

Form I R

CAS
CENTEC ANALYTICAL SERVICES, INC.

J.S. EPA Contract Laboratory Program
Sample Management Office
209 Madison Street, Suite 200
Alexandria, Virginia 22314
703/557-2490 FTS: 8-557-2490

EPA Sample # 3453 J-28

Date 12/22/87

INORGANIC ANALYSIS DATA SHEET

AB NAME CENTEC ANALYTICAL SERVICES, INC. CASE NO. SAS 3453J

OW NO. re: SAS 3453J LAB RECEIPT DATE 11-07-87

AB SAMPLE ID NO. 68396 QC REPORT NO. 226

Elements Identified and Measured

oncentration: Low ✓ Medium

atrix: Water ✓ Soil Sludge

Other Units mg/L

. Sulfate (SO_4)	89
. Fluoride (F)	1.7
. Total Phosphorus (TP)	1.80
. Hydrolyzable Phosphorus (HP)	1.30
. Orthophospnate (OP)	0.10

ootnotes: For reporting results to EPA, standard result qualifiers are used as defined on Cover Page. Additional flags or footnotes explaining results are encouraged. Definition of such flags must be explicit and contained on Cover Page, however.

omments:

Lab Manager

OK DAT 12/28/87